the antennae, notum, legs, and abdomen. The clypeal difference noted above is seen best in end-on view. It is reflected in the female *M. imperialis* by a slightly more depressed middle tooth. Another less definable difference lies in the pronotal ridge which is more sharply rounded in *M. imperialis* than in *M. rufinodus*.

Some Intertidal Insects from Western Mexico

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In the fall of 1966 I accompanied an expedition from Stanford's Hopkins Marine Station on an intertidal collecting trip in the Gulf of California and farther south. My objective was to collect intertidal insects, pseudoscorpions and chilopods because I happened to be investigating the ecology of the intertidal insects of California at that time. I also wanted to find out whether any of the Californian representatives of these forms are found on the Mexican mainland extending from about the middle of the Gulf at Guaymas, Sonora, to Barra De Navidad in the State of Jalisco. This stretch of coast, which is about a thousand miles in length, comprises a distinct marine littoral faunal zone, the Subtropical, along with the southern tip of Baja California and the Hawaiian Islands. The northern half of the Gulf, as well as the region extending southwards from Point Conception, California, to more than halfway down the west coast of Baja California constitutes the Warm-temperate region, while the region south of Acapulco, Mexico, is designated Tropical (Abbott, 1966; Ekman, 1953; Garth, 1955).

Collecting was done, for the most part, on rocky shores at low tide by watching for insects moving among barnacles, mussels or littorine molluscs or by prying open crevices in rocks with a crowbar and geological hammer.

Ensenado Lalo, the most northerly of the collecting areas, is situated west of Bahia San Carlos, Sonora, Mexico, and on 28–30 October several interesting intertidal insects were found in the barnacle (*Chthalamus*)—coralline algae (*Lithothamnium lamellatum* Setchell and Foslie) zone which forms a conspicuous white band on the upper tide level of the rocks at that time of the year. Normally *L. lamellatum* is whitish-pink but due possibly to the high temperatures of summer

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it dies and turns white. The barnacles and the dead algae form a porous crusty mass over the surface of the rocks that serves as a shelter and substrate for *Endeodes sonorensis* Moore (Melyridae) and *Orthophrys mexicanus* Van Duzee (Saldidae). *Endeodes sonorensis* was readily seen because the diurnal adults spend a great deal of the time foraging in the open at times of low tide. The larvae, however, are only found in crevices in the rocks (Moore, 1964) and *E. collaris* (LeConte) in California has similar habits. Other species of *Endeodes* are also intertidal and these are distributed from British Columbia to Baja California although the genus is primarily distributed in the Warm-temperate zone. *Endeodes insularis* Blackwelder, *E. blaisdelli* Moore, and *E. terminalis* Marshall are found in California south of Point Conception to Baja California; *E. basalis* (LeConte) is from the same area but Moore (1957) also records it from Monterey County, California; *E. rugiceps* Blackwelder is found in California both north and south of Point Conception. *Endeodes collaris* ranging from Monterey County, California to Vancouver, British Columbia, is the only species which is found exclusively in the Cold-temperate zone that extends north of Point Conception to Alaska, while *E. sonorensis* is the only species found in the Subtropical zone.

Orthophrys mexicanus was much more numerous in the barnacle-coralline algae habitat than *E. sonorensis* and adults and nymphs were found running rapidly into the cracks and dead barnacles and on the surface of the rocks. According to Polhemus (personal communication) a new genus must be proposed for this insect since *O. mexicanus*, named by Van Duzee from one specimen, is not even in the same subfamily as *Orthophrys*. Nevertheless, the fact that the habitat of this insect is intertidal is indeed interesting since only a few families of insects on a worldwide basis occupy the intertidal habitat and the Saldidae is one of these. The intertidal saldid, *Aepophilus bonnairei* Signoret, is found in northern Europe (China, 1927) while all species of the intertidal genus *Omania* are widely distributed (Herring and Chapman, 1967); *O. naurensis* Herring and Chapman from Micronesia, *O. samoensis* Kellen from Samoa, *O. marksae* Woodward from the Great Barrier Reef, *O. satoi* Miyamoto from Japan and *O. coleoptrata* Harvath from Oman, Arabia.

Orthophrys mexicanus apparently is the only intertidal saldid recorded from the new world and it is found in both the Subtropical region as well as the Warm-temperate since the type specimen was found under kelp on a beach on Angelo de la Guarda Island (Van Duzee, 1923) in the northern part of the Gulf of California. The

difference in habitats described for this specimen and the ones collected by me at Ensenado Lalo cannot be explained at present.

In rock crevices at the upper level of the barnacle-algae zone adult specimens of two species of carabids were found. One of these species, *Tachys corax,* which has been found in practically all of the western states, was named by LeConte in 1851 from specimens collected in Colorado. Its occurrence in the intertidal habitat in the Gulf of California may indicate that *T. corax* is a widely distributed, eurytopic species but it also may be another species even though it keys out to *corax* since it has never been found in the intertidal habitat anywhere else. Another *Tachys,* probably undescribed, also was found in the same high tide crevice habitat and it would not be surprising if other species were found in the intertidal habitat of more tropical shores as *Tachys,* according to Ball (1963), is a large and widely distributed genus being found in all of the warmer regions of the world. Carabids are, of course, well represented in the intertidal insect fauna. For example, *Aepus marinus* Ström of northern Europe and *Aepopsis robini* Laboulbène which is distributed in Europe and North Africa, inhabit crevices in rocky shores (Jeannel, 1941). *Kenodactylus capito* Broun occurs under intertidal stones on Campbell Island and *K. audouni* (Guerin) can be found in crevices of intertidal rocks in Chile and the Falkland Islands (Darlington, 1964). *Thalassotrechus barbarae* (Horn) is restricted to California, being found in high intertidal rocky shores (Van Dyke, 1918).

In addition to the carabids and such littoral animals as isopods, littorine and pelecypod molluscs and mites, some geophilomorph centipedes were also found in the high tide crevices. These have yet to be identified but they appear to be related to forms found in similar habitats in California.

Another crevice-dweller, found in rocks near Bahia San Carlos, was a pseudoscorpion (*Garypus* sp.). A large pseudoscorpion, *G. californicus* (Banks), is found under stones and in cracks of rocks in California and *G. giganteus* Chamberlin, an even larger one, which I presume is also intertidal, is found in Baja California; the San Carlos specimen is then the third intertidal *Garypus* from the California-Mexico region. This genus is also represented in the intertidal zone in Europe (Weygoldt, 1966).

The only intertidal insects collected in the vicinity of Mazatlan, Sinaloa were an unidentified staphylinid adult and some dipterous larvae found in a low intertidal rock crevice in the company of isopods, amphipods, littorine and pelecypod molluscs and polychaete annelids.

Staphylinids are, of course, the most common of the intertidal beetle fauna in all regions, and greatly outnumber all other beetles in terms of species with more than a dozen found in the rocky shore intertidal in California.

Although a search for insects, made while briefly stopping at Santa Cruz, Nayarit was fruitless, the final collecting place, Tenacatita Bay near Barra De Navidad, Jalisco, which is well south of the Gulf of California, yielded a very interesting intertidal beetle of the family Limnichidae. Specimens were found aggregated in groups of from six to twelve in high and mid-tide rock crevices at the south end of the bay. These beetles jumped an inch or two when disturbed but otherwise were slow moving. According to Spilman (personal communication) this insect represents a new genus in the Thaumastodinae of which there are at present three genera and four species. Only one of these species, *Martinius ripisaltator* Spilman, however, is intertidal, being found on moist sand among mangroves and on intertidal rocks in Cuba (Spilman, 1966). Another limnichid, *Throscinus crotchi* LeConte, in the Cephalobyrrhinae, has been collected on mudflats covered by high tide in San Diego County, California (Leech and Chandler, 1956).

Also found on the surfaces of intertidal rocks in the same area of Tenacatita Bay were some dipterous puparia and larvae, staphylinid larvae, several species of ubiquitous acarines and two unknown species of Collembola. This latter group is well represented in the intertidal zone all over the world and consists mostly of scavengers in and on sand and on rocky shores, either in crevices or freely moving over the surface. They are probably the most abundant intertidal insect in terms of species as well as numbers, but they are not well known. A pseudoscorpion, *Morikawa johnstoni* Chamberlin, was found in crevices a little higher than those containing the limnichids.

The beaches of western Mexico are not characterized by the large wrack fauna found in other more temperate parts of the world, including California, due to the absence of offshore kelp beds. Organic materials, such as dead animals, are occasionally washed ashore but the bulk of the food supply for beach scavengers appears to come from the land. *Phaleria debilis* LeConte (Tenebrionidae) was found in abundance at night at Tenacatita Bay feeding on decaying coconuts on the high part of the beach not covered by high tide. Several species of *Phaleria* are found in a similar habitat in California but dried kelp appears to be the main food for these. Another *Tachys* sp. (Carabidae) was found with *P. debilis* but, again, it is probably a supralittoral form. On the same beach in the daytime a large number

of tiger beetles (*Cicindela leucone* Bates) were seen on the moist sand left by the retreating waves.

In general, the intertidal insect fauna of the west coast of Mexico is not as extensive as that found in California at any time of the year. This is mainly due to the absence of intertidal algae and subtidal kelp beds which are a common feature of the California coast and which forms the food base for a large community of intertidal animals including insects. The only consistent source of energy for the intertidal insects in an area poorly or not at all represented by inter- and subtidal kelp would be the plankton and organic detritus brought in by each tide and deposited in crevices, shallow cracks and on the surface of intertidal rocks. The limnichids, carabids, melyrids, staphylinids and even saldids as well as the few flies, Collembola, pseudoscorpions and mites are likely to be scavengers feeding on stranded copepods (as I have observed carabids to do on the California coast) or other plankton or remains of macroscopic animals cast ashore by the tide, and among intertidal insects in general scavenging appears to be the most dominant activity.

The Subtropical intertidal insect fauna appears to be very distinctive, thus upholding the zoogeographic regions based on marine littoral faunal discontinuities for the Pacific coast of North America.

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A New Nearctic Species of *Karpinskiella*

(Hymenoptera : Pteromalidae)

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In the Pteromalidae, *Tomicobia* is one of a few genera that contain species that attack adult scolytid beetles (Hopkins 1913, Reid 1957, Hedqvist 1959, Bushing 1965). Mr. M. M. Furniss, U.S.D.A. Forest Service, Moscow, Idaho, reared a pteromalid from adults of *Dendroctonus* in Utah and suspected it to be *Tomicobia*. At the time, Dr. W. D. Bedard, U.S.D.A. Forest Service, Berkeley, California, was studying the biology of *Tomicobia tibialis* Ashmead associated with *Ips* in California, but did not rear any from *Dendroctonus* (Bedard 1965). This apparent difference in scolytid host preference prompted Mr. Furniss to send specimens of his Utah material to Dr. Bedard for comparison. Dr. Bedard discovered that though extremely close in resemblance there was a difference in the number of antennal ring segments between the Utah and California specimens.

The Utah specimens were brought to our attention for identification. We have decided that the Utah specimens belong in the genus *Karpinskiella*, which is closely related to *Tomicobia*. Both genera are separated